

IN THE CLAIMS:

Please cancel claims 1 and 14 without prejudice or disclaimer as to the subject matter contained therein. Please amend claims 2-13, 15-17 and 19, and add new claims 20-35 as follows. A marked-up version of the amended claims showing the revisions thereto is attached.

2. (Amended) The magnetic resonance imaging system of claim 21, wherein the predetermined direction is a longitudinal direction of the couch and the position changing unit is configured to move a position of the couch in the longitudinal direction relative to the fixed magnet.

3. (Amended) The magnetic resonance imaging system of claim 2, wherein the position changing unit is configured to change the position so that a center position of each of the plurality of RF coils in the longitudinal direction corresponds to the uniform region of the static magnetic field.

4. (Amended) The magnetic resonance imaging system of claim 3, wherein the reception processing unit comprises selection means for automatically selecting, from the echo signals received by each of the plurality of RF coils, the echo signal received by a certain RF coil located at the center of the uniform region in the longitudinal direction, an output of the selection means being routed to the image producing unit.

5. (Amended) The magnetic resonance imaging system of claim 4,
wherein the selection means comprises:

signal level detecting means for detecting a level of the echo signal
received by each of the plurality of RF coils; and

signal selecting means for automatically selecting the echo signal received
by the coil member located at the center of the uniform region in the longitudinal
direction based on changes in the level of the echo signal detected by the signal
level detecting means.

6. (Amended) The magnetic resonance imaging system of claim 3,
further comprising

an identification generating unit configured to generate an identification
number inherent to each RF coil, the identification generating unit being disposed
at each of the plurality of RF coils,

a size memorizing unit configured to memorize a size of each of the
plurality of RF coils in the longitudinal direction, the size corresponding to the
identification number of each RF coil generated by the ID generating unit,

a disposal detecting unit configured to identify each signal line of the
plurality of RF coils so as to detect a disposal state of the plurality of RF coils in
the longitudinal direction, and

a determination unit configured to determine the size based on detection information about the coil disposal state detected by the disposal detecting unit and providing the size to the size memorizing unit, wherein

the position changing unit includes means for moving the position of the couch based on the size determined by the determination unit, and

the reception unit comprising selection means for automatically selecting, from the echo signal received by each of the plurality of RF coils, an echo signal received by the RF coil located at the center of the uniform region in the longitudinal direction on the basis of the size determined by the determination unit and the coil disposal state detected by the disposal detecting unit, the detected echo signal being provided to the image producing unit.

7. (Amended) The magnetic resonance imaging system of claim 2, wherein:

the position changing unit comprises means for changing the position so that, of the plurality of RF coils constituting the multiple RF coil, an overlapped region of sensitivity distribution regions of any two RF coils which are mutually-adjointing corresponds with the uniform region of the static magnetic field in the longitudinal direction and the position changing unit moving the couch step by step by a distance corresponding to each RF coil in the longitudinal direction, and

the image producing unit comprises means for performing unfolding processing on a set of echo data obtained by the reception processing unit at every

position of the couch changed by the position changing unit on the basis of different sensitivity distributions of the plurality of RF coils.

8. (Amended) The magnetic resonance imaging system of claim 21, wherein each of the plurality of RF coils comprising the multiple RF coil is an array type of RF coil having a plurality of coil elements.

9. (Amended) The magnetic resonance imaging system of claim 21, wherein each of the plurality of coil members comprising the multiple RF coil is a whole-body coil.

10. (Amended) The magnetic resonance imaging system of claim 21, wherein the multiple RF coil is fixed to one of the object or the couch.

11. (Amended) A magnetic resonance imaging system comprising:
static magnetic field generating means for generating a static magnetic field containing a uniform region whose magnetic intensity is uniform;
a couch movable in a predetermined direction passing through the static magnetic field, an object to be imaged being laid on the couch;
a reception RF coil;

position changing means for automatically changing a relative position between the couch and the static magnetic field generating means in the predetermined direction;

scanning means for scanning the object by transmitting an RF pulse to the object at each position of the couch changed by the position changing means, the scanning including a measuring scan carried out for a sensitivity distribution of the reception MR coil;

reception means for receiving through the reception RF coil an echo signal in response to the scanning performed by the scanning means;

reception-processing means for processing the echo signal received by the reception means into echo data;

image producing means for producing an MR image from the echo data obtained in responsive to the imaging scan at each position of the couch changed by the position changing means; and

unfolding performing means for unfolding the MR image produced in response to each position of the couch using the echo data of the sensitivity distribution obtained at each position of the couch changed by the position changing means.

12. (Amended) The magnetic resonance imaging system of claim 20, wherein the reception RF coil is one in number.

13. (Amended) The magnetic resonance imaging system of claim 12,
wherein the reception RF coil is a whole-body coil used for both the transmission
of the RF pulse and the reception of the echo data.

15. (Amended) The magnetic resonance imaging system of claim 13,
wherein the position changing unit is configured to move the couch every half of a
length of the reception RF coil in the predetermined direction.

16. (Amended) The magnetic resonance imaging system of claim 20,
wherein the position changing unit configured to move the couch to a first couch
position and a second couch position, a region to be imaged of the object located
at the first couch position being shifted in part from a sensitivity distribution
region of the reception RF coil; and the region located at the second couch
position with the region being contained entirely in the sensitivity distribution
region of the reception RF coil,

the system further including an instruction unit configured to instruct a
contrast agent to be injected into the object when the couch is located at the
second position.

17. (Amended) The magnetic resonance imaging system of claim 16,
wherein:

the measuring scan is comprised of both a first sensitivity-distribution measuring scan for measuring a sensitivity distribution of the reception RF coil carried out when the couch is located at the first couch position and a second sensitivity-distribution measuring scan for measuring a sensitivity distribution of the reception RF coil carried out when the couch is located at the second couch position;

the imaging scan comprising both a first imaging scan for obtaining the MR image of the region carried out when the couch is located at the first couch position and a plurality of second imaging scans for obtaining the MR image of the region carried out when the couch is located at the second couch position;

the image producing unit is configured to reconstruct the echo data obtained by both of the first and second imaging scans into image data; and

the unfolding unit is configured to unfold the image data obtained through each of the second imaging scans using both the echo data obtained through the first and second sensitivity-distribution measuring scans and the image data obtained through the first imaging scan.

19. (Amended) An MR imaging method of obtaining an MR image of an object based on a sub-encoding technique (fast imaging technique) using a reception RF coil, the object being laid on a couch, the method comprising the steps of:

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acquiring echo data for coil sensitivity distributions of the reception RF coil and echo data for imaging at each of a plurality of positions each said position being mutually different in positional relationships between a region to be imaged of the object and the reception RF coil, the couch being moved from one position to another when each acquisition is completed;

producing the echo data for imaging into an image; and

unfolding the image acquired in response to each position of the object using the data of the coil sensitivity distributions.

Please add new claims 20-35 as follows:

--20. (New) A magnetic resonance imaging system comprising:

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a magnet configured to generate a static magnetic field containing a uniform region whose magnetic intensity is uniform;

a couch movable in a predetermined direction passing through the static magnetic field, an object to be imaged being laid on the couch;

a reception RF coil;

a position changing unit configured to automatically change a relative position between the couch and the magnet in the predetermined direction;

a scanning unit configured to scan the object by transmitting an RF pulse to the object at each position of the couch, and configured to perform a measuring scan to determine a sensitivity distribution of the reception MR coil;

a reception unit configured to receive through the reception RF coil an echo signal responsive to the scanning and to process the echo signal to obtain echo data;

an image producing unit configured to produce an MR image from the echo data obtained in response to the imaging scan at each position of the couch; and

an unfolding unit configured to unfold the MR image produced in response to each position of the couch using echo data of the sensitivity distribution obtained at each position of the couch.

21. (New) The magnetic resonance imaging system of claim 20, wherein the reception RF coil comprises a plurality of RF coils constituting a multiple RF coil.

22. (New) The magnetic resonance imaging system of claim 20, wherein the reception RF coil is fixed to the magnet.

23. (New) A magnetic resonance imaging system comprising:
a magnet configured to generate a static magnetic field containing a uniform region whose magnetic intensity is uniform;
a couch movable in a longitudinal direction passing through the static magnetic field, an object to be imaged being laid on the couch;

a reception multiple RF coil including a plurality of coil members positioned around the object;

a position changing unit configured to automatically change a relative position of the couch to the magnet in the longitudinal direction based on a length of each of the plurality of coil members in the longitudinal direction;

a scanning unit configured to scan the object by applying a given train of pulses to the object at each position determined by the position changing unit;

a reception unit configured to receive through the multiple RF coil an echo signal in response to the train of pulses applied by the scanning unit;

a reception-processing unit comprising a selection element configured to automatically select, from the echo signals received individually by the plurality of coil elements, the echo signal received by a certain coil member located at the center of the uniform region in the longitudinal direction and a processing element configured to process the selected echo signal into echo data; and

an image producing unit configured to produce an MR image based on the echo data processed by the reception-processing unit.

24. (New) The magnetic resonance imaging system of claim 23, wherein the position changing unit is configured to change the position of the couch so that a center position of each of the plurality of coil members in the longitudinal direction corresponds to the uniform region of the static magnetic field.

25. (New) The magnetic resonance imaging system of claim 23,
wherein the selection element comprises:

signal level detecting means for detecting a level of the echo signal
received by each of the plurality of coil members; and

signal selecting means for automatically selecting the echo signal received
by the coil member located at the center of the uniform region in the longitudinal
direction based on changes in a level of the echo signal detected by the signal level
detecting means.

26. (New) The magnetic resonance imaging system of claim 23,
wherein each of the plurality of coil members comprising the multiple RF coil is
an array type of RF coil comprising a plurality of coil elements.

27. (New) The magnetic resonance imaging system of claim 23,
wherein each of the plurality of coil members comprising the multiple RF coil is a
whole-body coil.

28. (New) The magnetic resonance imaging system of claim 23,
wherein the multiple RF coil is fixed at least one of the object or the couch.

29. (New) A magnetic resonance imaging system comprising:

a magnet configured to generate a static magnetic field containing a uniform region whose magnetic intensity is uniform;

a couch movable in a longitudinal direction•thereof passing through the static magnetic field, an object to be imaged being laid on the couch;

a reception multiple RF coil including a plurality of coil members positioned around the object;

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a position changing unit configured to automatically change a relative position of the couch with respect to the magnet in the longitudinal direction in accordance with a length of each of the plurality of coil members in the longitudinal direction;

a scanning unit configured to scan the object by applying a given train of pulses to the object at each position determined by the position changing unit;

a reception unit configured to receive through the multiple RF coil an echo signal in response to the train of pulses applied by the scanning unit;

a reception-processing unit comprising a selection element configured to automatically select, from the echo signals received individually by the plurality of coil elements, the echo signal received by a coil member located at a center of the uniform region in the longitudinal direction and a processing element configured to process the selected echo signal into echo data; and

an image producing unit configured to produce an MR image based on the echo data processed by the reception-processing unit.

30. (New) A magnetic resonance imaging system comprising:

a magnet configured to generate a static magnetic field containing a uniform region whose magnetic intensity is uniform;

a couch movable in a longitudinal direction passing through the static magnetic field, an object to be imaged being laid on the couch;

a reception multiple RF coil including a plurality of coil members positioned around the object;

an identification generating unit configured to generate an identification number of each coil member, the identification generating unit being disposed at each of the plurality of coil members,

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(could)

a size memorizing unit configured to memorize a size of each of the plurality of coil members in the longitudinal direction, the size corresponding to the identification number of each coil member generated by the identification generating unit,

a disposal detecting unit configured to identify each signal line of the plurality of coil members to detect a disposal state of the plurality of coil members in the longitudinal direction;

a determination unit configured to determine the size of each coil by referencing detection information about the coil disposal state detected by the disposal detecting unit to the size memorizing unit;

a position changing unit configured to automatically change a relative position of the couch with respect to the magnet in the longitudinal direction in

accordance with both of a length of each of the plurality of coil members in the longitudinal direction and the size determined by the determination unit;

a scanning unit configured to scan the object by applying a given train of pulses to the object at each position determined by the position changing unit;

a reception unit configured to receive through the multiple RF coil an echo signal in response to the train of pulses applied by the scanning unit;

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a reception-processing unit comprising a selection element configured to automatically select, from the echo signal received by each of the plurality of coil members, an echo signal received by the coil member located at the center of the uniform region in the longitudinal direction based on both the size determined by the determination unit and the coil disposal state detected by the disposal detecting unit, and a processing element configured to process the selected echo signal into echo data; and

an image producing unit configured to produce an MR image based on the echo data from the reception-processing unit.

31. (New) The magnetic resonance imaging system of claim 30, wherein the position changing unit is configured to change the position of the couch so that a center position of each of the plurality of coil members in the longitudinal direction corresponds to the uniform region of the static magnetic field.

32. (New) The magnetic resonance imaging system of claim 30,
wherein the selection element comprises:

signal level detecting means for detecting a level of the echo signal
received by each of the plurality of coil members; and

signal selecting means for automatically selecting the echo signal received
by the coil member located at the center of the uniform region in the longitudinal
direction based on changes in the level of the echo signal detected by the signal
level detecting means.

33. (New) The magnetic resonance imaging system of claim 30,
wherein each of the plurality of coil members comprising the multiple RF coil is
an array type of RF coil comprising a plurality of coil elements.

34. (New) The magnetic resonance imaging system of claim 30,
wherein each of the plurality of coil members comprising the multiple RF coil is a
whole-body coil.

35. (New) The magnetic resonance imaging system of claim 30,
wherein the multiple RF coil is fixed to at least one of the object or the couch.--
